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UAV Wireless Relay

Paul Kirchoff

Virginia Commonwealth University

Lawrence Ng

Virginia Commonwealth University

David Vieth

Virginia Commonwealth University

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Team Members:
P. Kirchoff, L. Ng, D. Vieth
Faculty Adviser:
Prof. Robert Klenke, Ph.D.

Sponsor: Brilliant Innovations

Sponsor Mentor: Peter Maxwell,
David Young

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UAV Wireless Relay

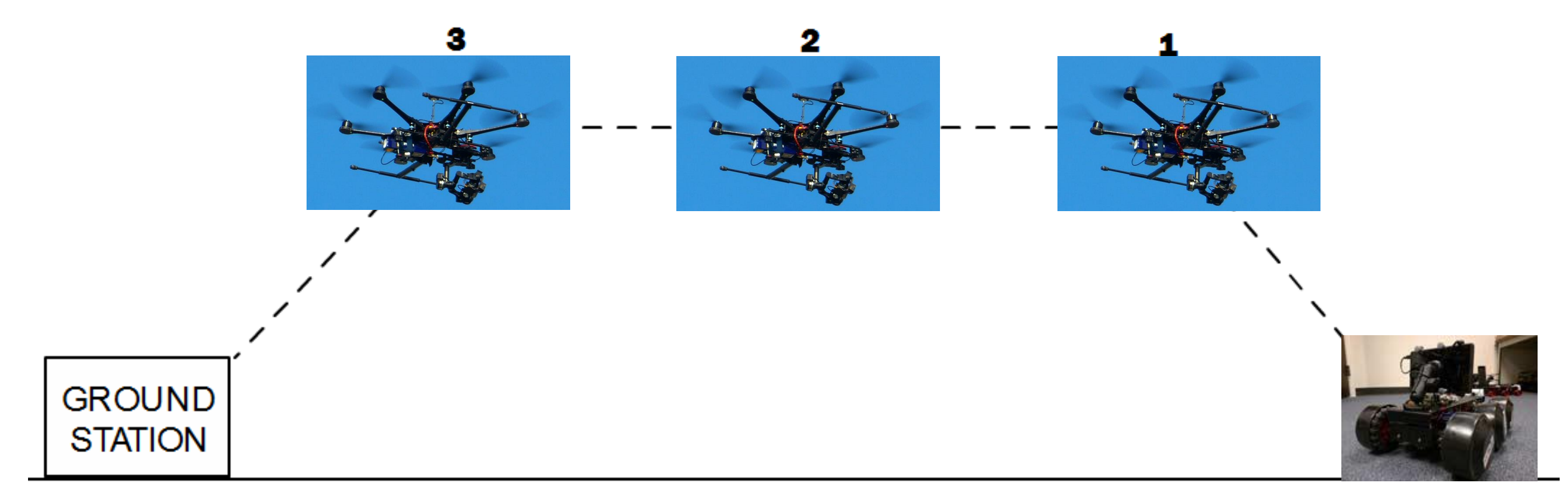
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Introduction

Often a scenario arises in which it is necessary to collect information from a hostile environment and the safest way to do this is the deployment of a small unmanned ground vehicle (UGV). In this situation the UGV will move around the environment while sending a live data stream back to the ground base. However, there can be limits on the maneuverability and range of the UGV making it difficult to complete this mission.

To solve this unmanned aerial vehicles (UAV) are used to assist in both the deployment of the UGV as well as handling the connection between the UGV and a ground base.

Specifically, the UAV's will intercept the data stream from the UGV and relay it to the ground base using a linear mesh network allowing for the UGV to move farther from the ground base.

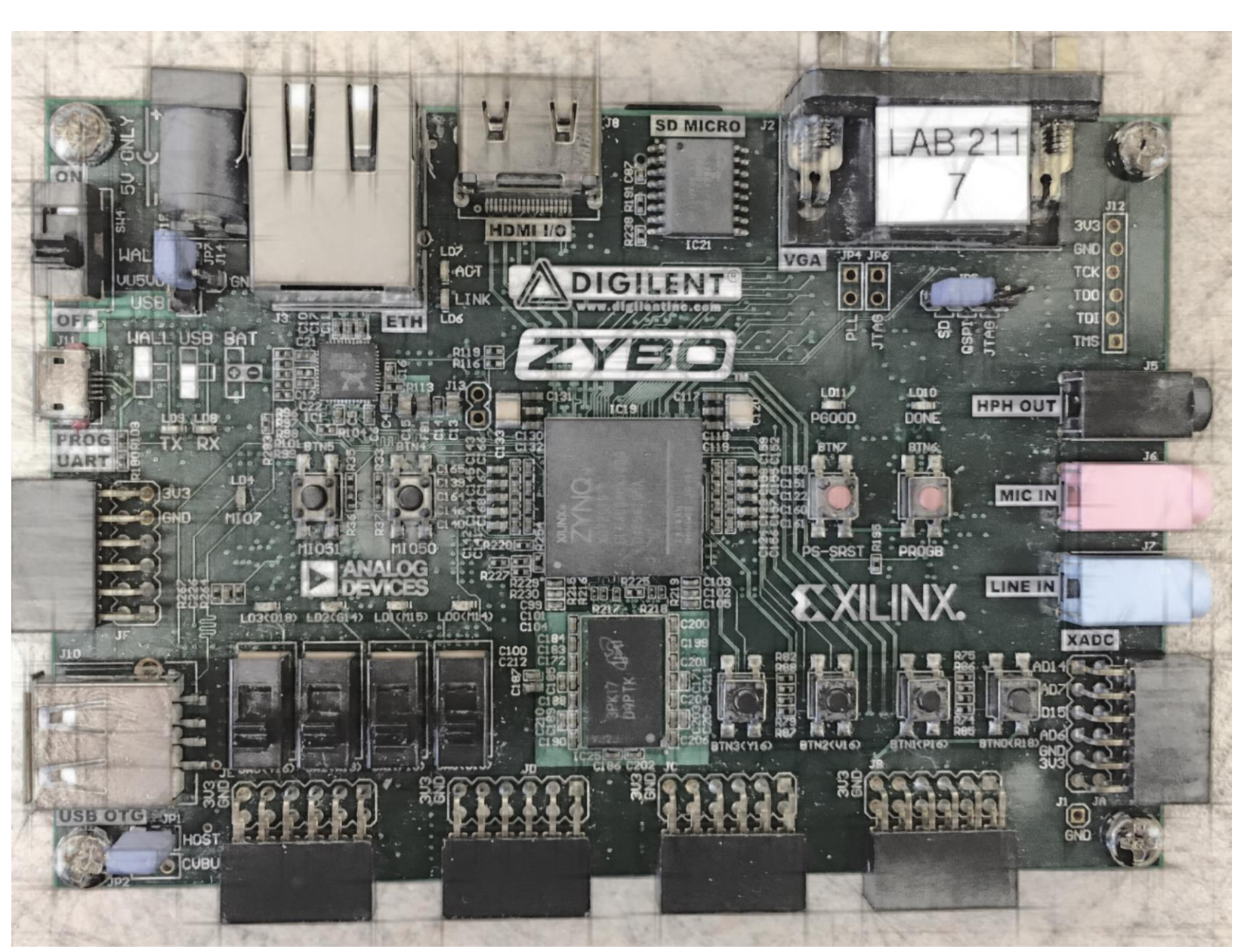


RAMS Simulator

Due to the limits of the availability and usage of drones necessary for this type of objective the project is being completed in simulation with the VCU RAMS Simulator. The RAMS Simulator is composed of UAV agents, simulated in Flightgear, and a network simulation. The simulator has been modified to allow for an external mission control system (MCS) that can control the drone's mission during autonomy.

This project is being completed by designing the MCS to utilize Zynq-7000 SoC board (Zybo) which will allow it to complete two functions.

- Relay the data stream from the UGV to the ground station, potentially across multiple UAV's.
- As the UGV moves the MCS will obtain its coordinates and calculate a new location for the UAV to optimize signal strength.



UAV Mission

The final objective of this project is for the UAV to complete the following tasks:

- Fly to the UGV drop off point and drop to a safe altitude to release the UGV.
- Takeoff and hover over the location at a specific altitude.
- As the UGV moves the UAV will change position to optimize the signal strength between the UGV and the ground base.
- Notify the ground base if the MCS is moving too far away for proper data stream quality.

